

REMARKS

Claims 1-43 and 45-64 are pending in the application. Claim 2-9, 19-37, 42-43, 46-53 and 62-64 are withdrawn from consideration. Reconsideration of the application is respectfully requested in view of the comments below

I. REJECTION OF CLAIMS 1 AND 45 UNDER 35 U.S.C. § 103(a)

Claims 1 and 45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,908,183 (Ennis) in view of U.S. Patent Publication No. 2003/0197129 (Murrell et al.). Withdrawal of this rejection is respectfully requested for at least the following reasons.

- i. A combination of Ennis and Murrell et al. do not teach the invention of claims 1 and 45 because the resultant combination does not provide a workpiece support structure that secures a workpiece having an implantation surface that faces downward toward the extraction assembly.*

Claims 1 and 45 each are directed to an ion system wherein an extraction assembly is configured to extract ions from a top portion of a chamber, and a workpiece support structure that is operable secure a workpiece having an implantation surface ***oriented facing downward toward the extraction assembly*** for implantation thereof. Even if the art could be properly combined (arguments in support of a lack of motivation to combine are provided *infra*), the combination of the cited art does not teach this feature.

As conceded in the Office Action, Ennis does not teach an extraction assembly. Murrell et al. do teach an extraction assembly, wherein ions are extracted from an ion source 10 in a first direction (e.g., vertically as illustrated in Fig. 1), mass-analyzed via a magnet 16, and directed in a second direction (e.g., horizontally in Fig. 1) toward a workpiece support structure (a holder in the housing 19). Therefore Murrell et al. teach

a workpiece support structure that secures the workpiece such that the implantation surface does not face downward **toward** the extraction assembly as claimed.

Not only does Murrell et al. not teach the feature of claims 1 and 45, but one of ordinary skill in the art would not be motivated to modify the reference in accordance with applicants' claims. Such a modification would render Murrell et al. unsatisfactory for its intended purpose, because the mass analysis of the ion beam causes an angle of about 90 degrees with respect to the extraction assembly. Therefore any modification in the workpiece support structure orientation would cause the mass analyzed beam to not strike the implantation surface. While Murrell et al. do state that directions provided therein are not necessary orientations, the 90 degree orientation relationship (regardless of what is top or bottom, etc.) between the workpiece support structure and the extraction assembly is necessary for proper operation of the system. Therefore the combination of Ennis and Murrell et al. do not teach the invention of claims 1 and 45. Accordingly, withdrawal of the rejection is respectfully requested.

ii. The system of Ennis does not employ mass analysis while Murrell et al. require mass analysis; consequently one of ordinary skill in the art would not be motivated to combine together the cited references.

It is conceded that prior art references may be combined together if one of ordinary skill in the art would be motivated to do so. Such motivation may be found in the references themselves, in the nature of the problem to be solved, or in the general knowledge of persons of ordinary skill in the art. MPEP § 2143.01. However, such motivation can not be vague or conclusory, but instead must be **clear and particular**. In re Dembiczak, 175 F.3d 994, 999 (Fed. Cir. 1999). It is respectfully submitted that upon an evaluation of the cited art as a whole in light of the above standard, the combination clearly is improper due to a lack of motivation for such a combination or modification.

Ennis teaches an ion implantation system that incorporates a pre-implantation cleaning system therein. Once the Ennis system has completed the pre-implantation

clean procedure, a concurrent implantation and contact formation process takes place. (See *generally* Cols. 6 and 7). More particularly (referring to Fig. 2), source material 32 contained in a crucible 33 is vaporized and ionized by an electron beam 34. The free electrons associated with the ionization process are ***electrostatically directed*** toward the wafer 11 to form implanted region 13, while the un-ionized source material is ***kinetically transported*** to the wafer 11 to form the conductive contact 16. (See, e.g., Col. 6, lns. 41-51).

From the above, it is clear that two separate items are directed toward the wafer, each having different masses (and different charge-to-mass ratios, since the one material is not charged at all). Consequently, ***a mass analysis system cannot be employed in Ennis because it will render the system inoperable by filtering out one or the other of the desired materials*** (the electrons or the un-ionized conductive material).

As highlighted in Fig. 1 of Murrell et al., ions are extracted from an ion source 10 and directed through a mass analysis system 16, wherein a magnet generates a dipole magnetic field to direct ions of differing charge-to-mass ratios along differing arcuate trajectories, thereby filtering out undesirable species. ***In the system of Murrell et al., the concurrent implantation and contact formation taught in Ennis is impossible.*** Therefore one of ordinary skill in the art would not have been motivated to combine Ennis with Murrell et al. since such a combination would render Ennis inoperable, or at least unsatisfactory for its intended purpose. MPEP § 2143.01 (V) (*citing In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984)(holding that if a proposed modification would render the prior art being modified unsatisfactory for its intended purpose, there is no suggestion or motivation to make the proposed modification). Accordingly, withdrawal of the rejection is respectfully requested for at least this additional reason.

- iii. Ennis does not teach an extraction assembly, and one of ordinary skill in the art would not be motivated to modify Ennis to incorporate an extraction assembly, as recited in claims 1 and 45.***

Ennis incorporates an ion implantation system that incorporates a pre-implantation cleaning sub-system local to the workpiece within a single vacuum chamber 22. (See Fig. 2). More particularly, pre-implantation cleaning is provided within the chamber 22 by flooding the implantation surface 11 with electrons generated from an annular flood filament 24 situated local to the workpiece. (See, e.g., Col. 5, Ins. 60-65). The electron flood results in a cleaning and annealing of the workpiece. (See, e.g., Col. 6, Ins. 10-11). The electron energy causes the workpiece to rise in temperature for annealing, and the temperature is monitored closely with a thermocouple 28, and can be actively cooled with a cooling tube 29. (See, e.g., Col. 6, Ins. 12-35). The above environmental control mechanisms taught in Ennis require the wafer 11 and source material to be situated within a single chamber 22. Therefore one of ordinary skill in the art would not be motivated to modify Ennis to form a separate extraction assembly that removes ions from the source chamber. Therefore for this additional reason, the combination of references is believed to be improper.

II. REJECTION OF CLAIMS 10-13, 15-16, 54-56 AND 58-59 UNDER 35 U.S.C. § 103(a)

Claims 10-13, 15-16, 54-56 and 58-59 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ennis in view of Murrell et al., and further in view of U.S. Patent No. 5,036,252 (Lob et al.). Withdrawal of this rejection is respectfully requested for at least the following reasons.

As highlighted above, the combination of Ennis and Murrell et al. do not teach the features of claims 1 and 45, respectively. Further, even if they did, as highlighted above, it has been shown that the combination of Ennis and Murrell et al. is improper due to a lack of motivation for the combination. Claims 10-13, 15-16, 54-56 and 58-59 each depend, either directly or indirectly, on claims 1 and 45, respectively. Lob et al. do

not remedy the deficiencies of Ennis and Murrell et al. Therefore claims 10-13, 15-16, 54-56 and 58-59 are non-obvious for at least the same reasons. Accordingly, withdrawal of the rejection is respectfully requested.

III. REJECTION OF CLAIMS 17-18, 38-41 AND 60-61 UNDER 35 U.S.C. § 103(a)

Claims 17-18, 38-41 and 60-61 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ennis, Murrell et al., Lob et al., and further in view of U.S. Patent 4,698,236 (Kellogg et al.). Withdrawal of this rejection is respectfully requested for at least the following reasons.

- i. The cited combination does not teach the invention, because Kellogg et al. do not teach interstitial pumping apertures in addition to the extraction apertures, as recited in claims 17, 38 and 60, respectively.*

Claims 17, 38 and 60 each recite a first extraction electrode that comprises extraction apertures extending therethrough. At least one of the other extraction electrodes comprises interstitial pumping apertures. ***Therefore the extraction apertures and the interstitial pumping apertures are different.*** Contrary to the assertion made in the Office Action, Kellogg et al. does not teach this feature.

The portion of Kellogg et al. cited in the Office Action (Col. 2, Ins. 60-68) does not go into detail regarding interstitial pumping apertures, but rather cites to U.S. Patent No. 3,961,103 (Aisenberg). Aisenberg discloses a film deposition apparatus in Fig. 1 in which a constrictor electrode 26 has an aperture 26A, and an anode extraction electrode 24 has an aperture 24A. According to Fig. 1, ***each electrode has a single aperture.*** According to Aisenberg, “[t]he apertures in the electrodes 24 and 26 permit differential pumping....” (Col. 4, Ins. 4-5). Therefore according to the cited portion of Kellogg et al. referencing Aisenberg, ***the reference does not teach additional interstitial pumping apertures that differ from an extraction aperture as claimed.*** Therefore the combination does not teach the invention of claims 17, 38 and 60.

Further, claims 18 and 61 further recite that the interstitial pumping apertures have an area that is greater than that of the extraction apertures. Since the cited art disclose the interstitial pumping aperture and extraction aperture being the same aperture, the cited art does not teach this feature. Therefore claims 18 and 61 are non-obvious over the cited art for this additional reason. Accordingly, withdrawal of the rejection is respectfully requested.


IV. CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-1733, EATNP138US.

Respectfully submitted,
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CERTIFICATE OF MAILING

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Date October 17, 2006

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